

F. BRAUN.
WIRELESS TELEGRAPHY.
APPLICATION FILED APR. 18, 1899.

NO MODEL.

fig. 1.

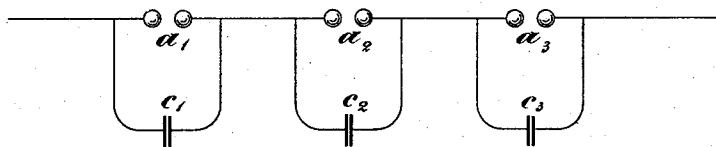
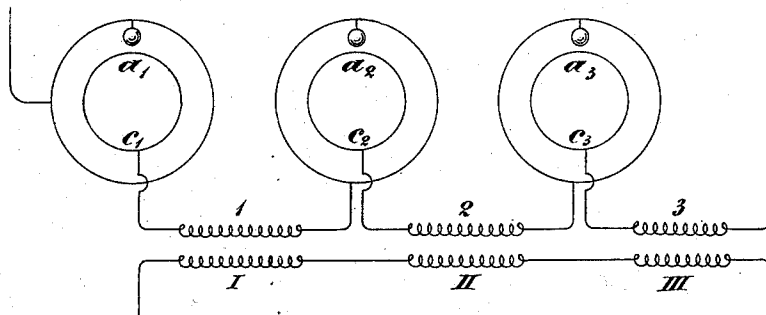


fig 2.



Attest:

G. M. Borch
S. D. T. Dourkf.

Inventor

Ferdinand Braun
Atty. in U.S.

UNITED STATES PATENT OFFICE.

FERDINAND BRAUN, OF STRASSBURG, GERMANY.

WIRELESS TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 743,056, dated November 3, 1903.

Application filed April 18, 1899. Serial No. 713,468. (No model.)

To all whom it may concern:

Be it known that I, FERDINAND BRAUN, a subject of the German Emperor, and a resident of Strassburg, Alsace, German Empire, have invented a new and useful Improvement in Wireless Telegraphy, of which the following is a specification.

My invention relates to the transmission of electrical signals without connecting-wires, and comprises the improvements hereinafter described.

In the accompanying drawings, which illustrate diagrammatically apparatus embodying the invention, Figure 1 illustrates a simple form of apparatus. Fig. 2 illustrates an apparatus providing for the use of induction-coils.

The period of oscillation of waves which are produced by discharging-condensers depends on capacity and self-induction, viz: $T = 2\pi\sqrt{LC}$, in which T denotes the period of oscillation, L the self-induction, and C the capacity. Theoretically, therefore, the energy of the waves should be able to be increased by raising the potential. Experience, however, has shown that there is a limit to the voltage which may be used at the terminals of a single spark-gap, the fact being that a certain critical value of distance is not to be exceeded, because above this value the discharge is no more of oscillatory nature. In order to increase the energy to be transmitted without disturbing the frequency, the arrangement shown in the drawings is used.

A plurality of condensers $C^1 C^2 C^3$ are shown in Fig. 1 connected in series. Each of them is provided with a spark-gap, all elements being of identical dimensions. If the first condenser receives a quantity of electricity $+E$, an equal quantity $-E$ is induced on its other coating and $+E$ accumulates on the second, &c.—that is, all condensers would be charged to exactly the same potential. The total potential, therefore, will be equal to the potential at a single condenser multiplied by the number of condensers, and the same must be true for the energy stored up. Experiments have shown that the discharge first actually takes place if the potential is attained which corresponds to a distance equal to the sum of the single sparking dis-

tances. Although one would be inclined to assume that as each condenser has its own circuit three separate trains of waves would be set up. This is not so. The waves produced nearly, if not exactly, at the same time will either coincide or interfere with each other. In the first case the amplitude of the electric impulse will be simply multiplied by the number of condensers. In the case of interference the maximum amplitude of the wave composed by its components will come approximately to the same value.

A modification of the invention is illustrated in Fig. 2.

The condensers $C^1 C^2 C^3$ are of spherical shape, each of them having its own air-gap $a^1 a^2 a^3$. The inner coating of one condenser is connected to the outer coating of the next across a coil 1 2 3, Fig. 2, which is a secondary to the primary I II III. The corresponding primaries are connected in series and joined to the terminals of a Ruhmkorff apparatus. Of course the insertion of these coils will influence the periodicity of oscillations.

The other part of the transmitting apparatus and the receiving apparatus, as the vertical transmitting-wire, the coherer, &c., are of the usual kind well known to electricians generally.

The invention can be altered in various ways. The coils, for instance, may be arranged in parallel instead of being in series connection. The main idea, however, remains the same—namely, to replace by a group of similar apparatus a single apparatus of known kind.

I do not generally claim the use of multiple spark-gaps for producing electric waves for wireless telegraphy, as such devices are known; but—

What I claim, and desire to secure by Letters Patent in the United States, is—

1. In a system of transmitting electrical signals by means of electrical waves, the combination with a plurality of identical condensers connected in series, of a spark-gap provided for each of said condensers, substantially as described and for the purpose stated.

2. In a system of transmitting electrical signals by means of electrical waves, the combination with a plurality of identical condensers connected in series, of a spark-gap pro-

vided to each of said condensers, and induction-coils between the outer coating of one and the inner coating of the next condenser, substantially as described and for the purpose stated.

5 3. In a system of transmitting electrical signals by means of electrical waves, the combination with a plurality of identical condensers connected in series, of a spark-gap provided for each of said condensers, and induction-coils between the outer coating of one
10 and the inner coating of the next condenser,

said coils being the primaries of transformers, the secondaries being connected to a Ruhmkorff induction apparatus, substantially as described and for the purpose stated. 15

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FERDINAND BRAUN.

Witnesses:

MAX ADLER,
FRITZ NIESS.